

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

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THE MAGNAVOX COMPANY, a corporation,
and SANDERS ASSOCIATES, INC., a
corporation,

Plaintiffs,
vs.

BALLY MANUFACTURING CORPORATION, a
corporation, et al.,

Defendants.

CIVIL ACTION
NO. 74-C-1030

2 85443

DEPOSITION OF

NOLAN K. BUSHNELL

MONDAY, JULY 14, 1975

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IRVIN C. SCHEISE
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13 BE IT REMEMBERED, That pursuant to Notice of Taking
14 Deposition and Subpoena Duces Tecum, and on Monday, the 14th
15 day of July, 1975, commencing at the hour of 10 a.m. thereof,
16 at the County Law Library Conference Room, 270 Grant Avenue,
17 Palo Alto, California, before me, IRVIN C. SHEIBE, a Notary
18 Public in and for the City and County of San Francisco, State
19 of California, personally appeared

20 NOLAN K. BUSHNELL,

21 called as a witness by the plaintiffs, who, being by me first
22 duly sworn, was thereupon examined and interrogated as herein-
23 after set forth.

24 Messrs. NEUMAN, WILLIAMS, ANDERSON & OLSON, represented
25 by THEODORE W. ANDERSON, Esq., and JAMES T. WILLIAMS, Esq.,
26 appears as counsel on behalf of the plaintiffs, with THOMAS A.
27 BRICDY, Esq., Corporate Patent Counsel, Director, Patent &
28 Licensing Department, The Magnavox Company, also present.

1 Messrs. FITCH, EVEN, TABIN & LEUDEKA, represented by
2 DONALD L. WELSH, Esq., and A. SIDNEY KATZ, Esq., appeared as
3 counsel for the defendants Bally Manufacturing Corporation,
4 Midway Manufacturing Company and Empire Distributing, Inc.

5 Messrs. FLEHR, HORNBACK, TEST, ALBRITTON & HERBERT, repre-
6 sented by THOMAS O. HERBERT, Esq., and BAYLOR G. RIDDELL, Esq.,
7 appears as counsel for the defendants Atari, Inc. and Kee Games.

— 8 —

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10 NOLAN K. BUSHNELL,

11 having been first duly sworn, testified as follows:

12 EXAMINATION BY MR. ANDERSON:

13 MR. ANDERSON: Q. Mr. Bushnell, will you please state your
14 full name? A. Nolan K. Bushnell.

15 Q. I place before you a transcript entitled "Deposition of
16 Nolan K. Bushnell, July 3, 1974," and it's in this same case,
17 the Magnavox Company vs. Bally, Civil Action 74-C-1030.

18 Do you recall giving testimony in this case?

19 A. Yes, I do.

20 Q. On July 3, 1974 or thereabouts? A. Yes.

21 Q. Have you had occasion to read the transcript of your
22 deposition? A. No. I haven't.

23 Q. Do you still reside at the same place indicated at that
24 time? A. What did it say?

25 Q. 6191 Alvarado, Campbell, California?

26 A. Yes, right.

27 Q. By whom are you employed? A. Atari, Incorporated.

28 Q. What is your position? A. Chairman of the Board.

1 Q. Do you hold any other positions with Atari, Incorporated?
2 A. No, I do not.

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20 MR. ANDERSON: Mr. Herbert, we have subpoenaed for
21 depositions during this week both Atari, Inc. and Kee Games,
22 Inc., and it is my understanding from conversations with you
23 that both Atari, Inc., and Kee Games, Inc. are producing
24 Mr. Nolan Bushnell as their designated representative under
25 the provisions of Rule 30(b)(6).
26 MR. HERBERT: Yes. We have filed a designation with the
27 court, and, of course, served you by mail with a copy which
28 apparently you have not received.

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20 MR. ANDERSON: Q. Mr. Bushnell, have you produced in an
21 organization according to the paragraphs of the Attachment A to
22 the subpoena so that we can know what you are producing in
23 response to each paragraph? A. Fine.
24 Q. Let's begin with Paragraph 1 of Attachment A, and that is
25 a request for schematic diagrams, circuit diagrams and wiring
26 diagrams of certain specified games.
27 A. That comes here, and essentially the document that we are
28 producing here is what we would call our service manual.

1 Q. And that's a black notebook; am I correct?

2 A. That is a black looseleaf binder. It has an advertising
3 flier as well as a certain amount of manufacturing information,
4 the schematic diagrams, the parts list of the games Pong, Pong
5 Doubles, Superpong, Quadrapong, Space Race, Gotcha, Color
6 Gotcha, which was not on there, but we chose to, rather than
7 break up the thing, it's just-- World Cup, Rebound, basic
8 television information concerning our games. That's basically
9 that piece of the--

10 In this envelope we have the schematics of Elimination,
11 Spike, Formula K, Twin Racer and GT-10.

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19 Q. Then if I understand your testimony, you have nothing to
20 produce under Paragraph 2 which has not already been produced
21 in the black book under Paragraph 1?

22 A. That's correct.

23 Q. That essentially includes all of the documents of Atari,
24 Inc. under the circuit diagrams, schematic diagrams, and the
25 manual of manufacture, testing and servicing?

26 A. To the best of my knowledge, that's correct.

27 Q. Do you send any service information to the field?

28 A. That's what this is.

1 Q. Is it identified as field service manuals or anything of
2 that sort? A. This is a field service manual that
3 we are presenting here.
4 Q: The black book is a field service manual?
5 A. Yes, to authorized Atari service representatives.

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4 MR. ANDERSON: I will ask the reporter, then, while we take
5 a break to number each page sequentially of the black notebook
6 that you have produced as a service representative's notebook.

7 Q. Mr. Bushnell, is every Atari distributor also a service
8 representative? A. Yes.

9 Q. So the black notebook that we are about to mark and number
10 goes to every distributor of Atari products plus certain
11 operators who also function as authorized service representatives,
12 is that correct? A. Correct.

13 MR. ANDERSON: I will have the reporter mark the black
14 notebook as Atari, Inc. Deposition Exhibit 2, and I will ask
15 that he number the pages one through whatever it takes so they
16 will read Atari Deposition Exhibit 2-1 through 2-100 or what-
17 ever the last number is.

1 picture which appears on the Quadrapong game? A. Correct.

2 Q. And that is the Quadrapong game as it is made and sold by
3 Atari; am I correct? A. That's right.

4 Q. As another example, Atari Exhibit 27 shows the instructions
5 right on the plate. Is that the plate as it would be prepared
6 and attached to the game Pong Doubles as made and sold by Atari?

7 A. Right, yes.

8 Q. Before the luncheon break, I asked you to relate the specific
9 conversation that you had with Mr. Sam Stern, and you wished to
10 discuss that matter with counsel during the luncheon break. Can
11 you now relate that conversation that you had with Mr. Sam
12 Stern? A. Yes.

2 85452

13 Q. Will you do that? A. The conversation was
14 essentially a proposal that we license Williams under our
15 patent, and part of the discussion was, well, what about the
16 Magnavox situation.

17 I related that I felt that the Magnavox patents were with-
18 out merit, and, at any rate, did not read on our devices, and
19 that as part of the licensing arrangements, we would indemnify
20 them against any patent action.

21 Q. Is there any document in existence that you know of that
22 relates to or refers to that conversation? A. No.

23 Q. When did you say that conversation occurred?

24 A. It was probably a couple of months prior to the actual fil-
25 ing of the Magnavox suit in Chicago.

26 Q. The Magnavox suit against Seeburg? A. Yes.

27 MR. HERBERT: Pardon me. Was Seeburg sued originally in
28 Chicago?

1 MR. ANDERSON: No. The first suit was against Bally, and
2 later a suit was filed against Seeburg.

3 Q. Williams is a subsidiary or portion of Seeburg; is that
4 correct? A. Correct.

5 MR. HERBERT: For the witness' assistance, the suit against
6 Bally was also against Atari. 2 85453

7 MR. ANDERSON: Originally, yes.

8 MR. HERBERT: Yes, originally.

9 THE WITNESS: It's that original suit that I'm using as my
10 date reference.

11 MR. ANDERSON: Q. It was before that original suit?

12 A. Right.

13 Q. What was the basis of your statements to Mr. Stern that the
14 Magnavox patents--I'm not sure of your term--were without merit,
15 I think you said. A. He expressed the fact that
16 he had been contacted by Magnavox and had asked what the situa-
17 tion was, and my statement was that I felt that there was not
18 only significant prior art, but that uniqueness or anything
19 special concerning the Magnavox patents, you know, were in the
20 minds of Magnavox alone.

21 Q. Was that statement by you based on some investigation that
22 you made or had caused to be made? A. Yes.

23 Q. What investigation is that?

24 A. I had attempted to ascertain for my own understanding the
25 basic question of what validity the Magnavox suits were. I did
26 some research.

27 Q. Excuse me. Was there a suit pending then?

28 A. No, there was not.

1 Q. What suit are you referring to in your answer?

2 A. I should say we had been contacted by Magnavox essentially
3 saying that we had infringed, so therefore I was interested in
4 finding out whether the Magnavox assertions had any validity
5 whatsoever. I searched for prior art, talked to various people
6 concerning prior art, and attempted to acquaint myself with
7 patent law and the things related thereto, and convinced myself
8 that I had nothing to worry about.

9 Q. What documents do you have relating to investigation about
10 which you have just testified?

11 A. We have a series of documents concerning some of the search
12 of prior art that we have made. I have some notes concerning
13 conversations with certain people. I have notes concerning
14 conversations with people in the academic profession, and
15 those are primarily the documents.

16 Q. You mentioned you have a search of prior art. Is that a
17 search that you personally made? **2 85454**

18 A. We have had cause to make.

19 Q. When you say "we," who do you mean? A. Atari.

20 Q. Not yourself personally or Syzygy, but Atari?

21 A. Right.

22 Q. So it happened sometime after in the summer of '72; is that
23 correct? A. That's correct.

24 Q. What persons did you cause to do this searching?

25 A. It was handled through Bill White, our financial vice-
26 president, that particular search. He handles a lot of our
27 legal matters as well.

28 Q. Did he personally do it? A. No. He retained a

1 professional librarian.

2 Q. Who is the professional librarian?

3 A. I don't know her name.

2 85455

4 Q. A girl, lady? A. Yes.

5 Q. Where is she located? A. I think in Berkeley.

6 Q. At that time, when you caused this search to be made, just
7 when was that? A. It was several months prior to the
8 suit. It was subsequent, I think, to the contact by Mr. Briody
9 to Atari.

10 Q. You said that specific search was handled by Mr. White. Were
11 there any other searches other than that one by the professional
12 woman searcher?

A. As far as prior art, I believe
that I had Mr. Alcorn or someone in the engineering department
go through some of the technical manuals for prior art.

15 Q. At that time, what knowledge did Atari have of the Magnavox
16 Odyssey? A. Atari per se, we knew it was on the
17 market. No technical information.

18 Q. Did the professional searcher render a report to you?

19 A. She brought back a series of documents that she felt could
20 perhaps pertain in this situation.

21 Q. Is that in a file that Atari now retains?

22 A. It's somewhere. I haven't seen it for the last couple of
23 months. I don't really know exactly where it is. I think I
24 can find it.

25 Q. You do still have it? A. Yes.

26 Q. You said there are notes on conversations with certain
27 people, and then there are notes, other notes apparently, con-
cerning communications with people in the academic profession.

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16 Mr. Bushnell, in Atari Exhibit 2, the first page is
17 apparently just a title page. The second page is a table of
18 contents. Does that table of contents, to the best of your
19 knowledge, accurately describe what is in the book Exhibit 2
20 which is distributed to your service representatives?

21 | a Yes it does

22 Q. Does it include material on the games Pong, Pong Doubles,
23 Superpong, Quadrapong, Space Race, Gotcha, Color Gotcha, World
24 Cup and Rebound? A. Yes, it does.

A. Yes, it does.

25 Q. Are they in that order in the book? A. Yes

26 Q. Is there a divider where each of the different games begins
27 in the book? A. Correct.

28. Q. Before the first divider, which is Pong, there is some

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12 Q. Under the divider Pong, what documents are included in that
13 section of your service representatives' book?

14 A. It's got a flier which essentially has a picture of the
15 unit and other descriptive promotional areas. It has a wiring
16 diagram.

17 Q. You are taking them right in order. Identify the pages as
18 you go. It might be helpful later.

19 A. 2-26 is the wiring diagram. 2-27 is the stuffing diagram
20 showing the layout of the computer, which I have marked
21 confidential. The stuffing of the items, et cetera. The
22 reason this is marked confidential is that many of the machines
23 that were sold had some of the numbers deleted so that it would
24 interfere with reverse engineering on the item.

25 Q. Is the drawing what you have called the stuffing diagram
26 2-27 an accurate diagram of the logic board of the game Pong
27 as it was made and sold by Atari? A. Yes, it is.

28 Q. The only difference from this and what one would find in

1 The actual game is that some of the numbers are deleted in the
2 actual game? A. Correct.

3 Q. In all of the actual games, or just some of them?

4 A. The games that were produced for-- Not all the numbers,
5 but all the numbers on some of the games were deleted.

6 Q. Are some of the games in the field with all of the numbers
7 visible? A. In some of the later units, that's
8 true.

9 Q. Why was a change in that practice effected in the later
10 units? A. We had already gotten copied at that point
11 in time, so we figured, you know, why close the door. You don't
12 have to keep closing the door after the horse gets out.

13 Q. Who has copied your game Pong?

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14 A. Oh, a company in Florida called Allied Leisure.

15 Q. Who else? Anyone else? A. Well, when I say copied,
16 they had games that were similar. There were several companies
17 in Europe.

18 Q. Did Midway make the same game called Pong?

19 A. Yes. Not called Pong, called Winner.

20 Q. They call it Winner and you call it Pong; is that correct?

21 A. Pong is our trademark.

22 Q. Is the stuffing diagram the same, do you know, for the two
23 games? A. I think it was. We supplied them with that
24 document.

25 Q. With respect to Exhibit 2-28, is that a circuit diagram of
26 the Pong game as made and sold by Atari? A. Yes.

27 Q. Is it accurate to the best of your knowledge? A. Yes.

28 Q. It actually does show the logic of the game Pong as made and

7 sold; am I correct?

A. Right.

2 Q. Were all the Pong games made substantially identically to
3 this circuit diagram? A. There were several revisions.
4 This is Revision E, I believe. Some of them were from prior
5 revisions. But the differences were minor.

6 Q. Can you tell from the drawing that it represents Revision E,
7 or is that just from your recollection?

8 A. Just from my recollection. In fact, it says G here. I
9 didn't realize we had manufactured any of Revision G.

10 Q. Is the game Pong still a production item at Atari?

11 A. No, not currently.

12 Q. Is it considered obsolete? A. Yes, it is. We
13 haven't made that for two years.

14 Q. I notice a little eight-segment figure on the center of
15 2-23. Did you use eight-segment numbers for any purpose in the
16 Pong game? A. Never.

17 Q. What does that little figure signify?

2 85459

18 A. That's a--

19 Q. I mean seven-segment. I am sorry.

20 A. Yes. We used a seven-segment display.

21 Q. It looks like an eight. You did use seven segments?

22 A. Yes.

23 Q. In all of the Pong games--

A. Yes.

24 Q. --or just in some of them?

25 With respect to the remaining documents in separation Pong,
26 up to and including Page 2-33 of Exhibit 2, do they all accurately
27 represent the Pong game as it was made and sold by Atari, to
28 the best of your knowledge? A. To the best of my

1 knowledge. Parts list. _____

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15 MR. ANDERSON: Q. Mr. Bushnell, will you describe the next
16 change that you recall in the Pong game in the course of

17 production? A. Oh, I think we had a problem with a
18 device known as the 7427, and we attempted to design the device
19 out from a supply problem. The devices were extremely scarce
20 and we tried to substitute another device in there. So there
21 may be some games which have a DM820 on or something like that
22 in place of that unit.

23 Q. What is a 7427, do you recall?

24 A. It's a 3-input NOR gate, I think.

25 Q. Was the replacement device the same functionally, a 3-
26 input NOR gate or whatever the 7427 was?

27 A. No. I think it was a 4-input NAND. I am not sure. These
28 numbers are difficult veiled by two years of time, and in an

1 area which has not been foremost on my mind since then.

2 Q. Did the game logic function for all intents and purposes
3 the same with the 7427 or with the substitute device?

4 A. Yes.

5 Q. So that if it was a 4-input NAND that was substituted for
6 a 5-input NOR gate, it was designed into the circuit so it
7 functioned for all intents and purposes in the same way?

8 A. Right. Logic generation is, you know, something that is--
9 you know, there are many ways to skin a cat.

0 Q. Were there any other changes in the course of production of
1 the Pong game that Atari made and sold?

2 A. Not that come screaming to mind. I imagine there were some
3 component substitutions and things like that. But nothing of
4 a material nature that I can recollect.

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2 85463

7 Q. In the first Pong games made and sold by Atari, Inc., what
8 television receiver or other display device was employed?

9 A. Well, we had several uses. We generally used a Hitachi
10 12-inch TV receiver modified to be a monitor.

11 Q. Was the Hitachi 12-inch television receiver used throughout
12 the Pong run? A. No. I think we used some Toshibas.
13 What else? MGA, Mitsubishi.

14 Q. Was that a television receiver when you acquired it that
15 was designed for home entertainment use? A. Yes.

16 Q. And sold under the trademark MGA? A. Right.

17 Q. Were any other television receivers or other display tubes
18 used in Pong during the run? A. No.

19 Q. Were the Toshiba and MGA sets also 12-inch sets?

20 A. Yes.

21 Q. When you say that the television receivers which you pur-
22 chased were modified before they were put in Pong, what modifi-
23 cations did Hitachi make before they incorporated the television
24 receiver in the Pong game? A. Bypassing the receiver
25 section in the units.

26 Q. You mean the RF and the IF? A. Yes. A lot of
27 these things are in a very noisy radio environment, and to go
28 through the RF section would just be creating a lot of problems.

1 So we wanted to go into high-level signals so that it would
2 minimize interference.

3 Q. Did you bring that high-level signal in just beyond the
4 video detector, then? A. I believe that's true. It's
5 into the first video amplifier.

6 Q. Did you have Hitachi then make some sort of a connection
7 between the input on the first video amplifier and the external
8 cabinet of the television receiver as you received it?

9 A. Yes.

2 85464

10 Q. What connection did you use? Did you use the antenna
11 terminal? A. Right.

12 Q. So you disconnected the antenna from the antenna terminal
13 and connected a wire from the antenna terminal to the input of
14 the first video amplifier? A. Yes, right. It was a
15 handy place to get a free terminal, you know.

16 Q. Were there any other modifications that you made in the
17 Hitachi, Toshiba or MCA 12-inch receivers when you modified
18 them to go into Pong? A. I think some of the
19 units were modified if we shipped them foreign to make sure
20 that they didn't fool around or didn't jump with the 50-cycles
21 so that they'd work better on 50-cycles, but I don't remember
22 the substance of that modification. We pulled knobs off of
23 them and did a few other things, drilled some holes in them for
24 mounting, stuff like that.

25 Q. Did you provide in the modification some connection from
26 your Pong logic board to the audio input of the TV receiver?

27 A. You are right, we did that also.

28 Q. Is that all that you can recall that you did to modify the

1 television receiver to go into your Pong game? A. Right.

2 Q. The next game in Exhibit 2 is--

3 A. I might add in some of them we pulled the tuner out, and in

4 some we just left the tuner in disconnected.

5 Q. You actually physically removed the tuner in some cases?

6 A. Yes.

7 Q. Was there a reason why you removed the tuner in some cases?

8 A. Yes. We thought we could sell them.

9 Q. It had resale value? A. Yes. 2 85465

10 Q. Did you find that was not true? A. Yes. You

11 know, it cost just as much to pull them out as we got for the

12 thing, so it was marginal at best.

13 Q. What television receiver or other display tube was used in

14 Pong Doubles? A. I think we went up to a 16-inch

15 Hitachi, and I think that's all we used in that one was Hitachi.

16 Q. Was that a Hitachi television receiver sold for home enter-

17 tainment that you modified? A. Yes.

18 Q. Did you make the same modifications to that 16-inch Hitachi

19 for Double Pong that you said you made in Pong?

20 A. Yes.

21 Q. Did you use any other television receivers in Pong Doubles

22 other than the 16-inch Hitachi?

23 A. Not to my recollection.

24 Q. In Superpong, what television receiver did you use?

25 A. I think we used a 19-inch Zenith.

26 Q. Will the documents that are in Exhibit 2 indicate what

27 television receiver was used in each of these games?

28 A. Not necessarily.

1 Q. If it is indicated, could you find out where that would be
2 indicated in Exhibit 2? A. What it does, I think towards
3 the back of the book we have all sorts of different TV informa-
4 tion which pretty much clarifies which ever one that you happen
5 to have so you would have the appropriate service information.

6 Here we have the heading, "TV Information," and it goes
7 through it. Motorola 20-inch monitor.

8 Q. That starts at Page 2-167? A. Right. We have
9 schematics here, appropriate things, engineering bulletins.
10 Here's the Zenith service manual. 2 85466

11 Q. Page 2-173 and the following pages? A. Right.

12 Q. Is there any way that we can relate those television
13 receiver service manuals to specific games made and sold by
14 Atari? A. No. But why don't we just, for
15 the sake of expedience, say that the Motorola 20-inch monitor
16 was used in all games subsequent, starting halfway through
17 Quadrapong and has been used essentially exclusively since then.
18 Prior to that, the Zenith was used through part of Quadrapong,
19 part of Gotcha, and part of Superpong. So if you picked up a
20 Quadrapong--and I might say that that includes Elimination and
21 Spike. Both of those used a Zenith also. Buy Elimination,
22 Quadrapong or Spike or Rebound and chances are you've got a
23 Zenith TV monitor in it. Anything after that you will have a
24 Motorola monitor. So based on that information, you should be
25 able to make a good correlation for whatever purpose you wanted
26 to draw.

27 Q. Am I correct that insofar as the circuitry from the input
28 of the first video amplifier onto the picture tube, the Motorola

1 20-inch TV monitor would be essentially the same as these
2 various TV sets that you have referred to?

3 A. I don't know. I haven't studied enough to make that kind
4 of pronouncement.

5 Q. Is the difference as far as you know between a monitor and
6 a television receiver sold for home entertainment use, that
7 the monitor does not include the RF and tuner section?

8 A. Well, when you say monitor or home use, you know, I don't
9 know how technical you want a person to get. But, you know,
10 there are a lot of differences in all kinds of monitors. You
11 can go from the PAL system that's used in Europe, to the SECAMP
12 that's used only in France and Russia, to the NTSC system
13 which is used only in the United States. These are various
14 types of raster scan techniques. You have all kinds of
15 different monitors that are used in the computer business.
16 Millions of types of raster types, millions of types of XY
17 types.

2 85467

18 Q. When you say millions of types, you are using some academic
19 freedom there. A. I'm using some academic freedom.
20 But there are many, many different designs. There's polar
21 scans. There's XY scans. There's what we call diddle coils
22 when it gets on the thing. They are all basically cathode ray
23 tube display devices which, you know, are especially adapted
24 for one purpose or another, but all essentially are for display
25 units.

26 Q. But the Motorola 20-inch TV monitor which is in Exhibit 2
27 as Pages 2-168 on, that used the NTSC system, I take it, did it?
28 A. Yes, the United States system.

1 Q. And it used-- A. Actually, there's a little academic
2 freedom there. The NTSC system is generally referred to color
3 systems, and this was a black and white unit, though the basic
4 525 line format was used on this.

5 Q. When you say 525 lines, you mean a monitor that had hori-
6 zontal and vertical sweep circuits and synchronization circuits
7 in it? A. Sure.

8 Q. And video amplifiers? A. Right. 2 85468

9 Q. Which were all used to generate a 525 horizontal line
10 raster; am I correct? A. Right.

11 Q. Have you ever used any monitor in manufacturing a Atari
12 game or any television receiver which did not satisfy that
13 definition that I just gave you on the preceding question?

14 A. Yes.

15 Q. What monitor or TV receiver have you used in an Atari game
16 that did not satisfy that definition?

17 A. We went to a PAL line rate frequency for a game called
18 World Cup. I believe it had a different number of lines, or
19 the timing was changed to be, I'm not sure if it was the PAL
20 or the SECAMP. But it was made so that a foreign monitor would
21 react more favorable.

22 Q. That is a foreign television receiver type monitor?

23 A. Exactly.

24 Q. I don't think I mentioned 525 lines in my definition. Other
25 than the change in lines, that monitor that you used in World
26 Cup would be a monitor having a series of video amplifiers?

27 A. Not a series. A.

28 Q. A single video amplifier? A. Yes.

1 Q. One-stage? A. Yes.

2 Q. And that was applied to control electrodes in a television
3 picture tube? A. Right.

4 Q. And it also included horizontal and vertical sweep circuitry?

5 A. Right.

6 Q. With some means for synchronizing those sweeps with the
7 video picture? A. Correct.

8 Q. And that was applied to the video amplifier.

9 Did the Motorola 20-inch TV monitor include an audio system?

10 A. I think it included one. I don't believe that we used it.

11 Q. Did the monitor that you used for World Cup include an
12 audio? A. Yes.

13 MR. ANDERSON: Let's take a short break.

14 (Short recess)

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15 ---

16 MR. ANDERSON: Q. Mr. Bushnell, just before we took the
17 break, I was asking you a bit about the Motorola 20-inch TV
18 monitor, and also about the TV receivers that Atari has used
19 in manufacturing its games. It is my understanding that all
20 television receivers that Atari used in its manufacture of
21 games were modified in generally the same way. Am I correct?

22 A. That's correct.

23 Q. After they were modified and installed in a game by Atari,
24 did the modified television receiver for all purposes significant
25 to Atari function in the same way as the Motorola 20-inch
26 monitor? A. Like I say, with the exception of
27 components in the foreign units, which had a different line
28 scan.

1 Q. But the Motorola 20-inch TV monitor was a 525-inch line
2 scan; am I correct? A. 525 line scan.

3 Q. And the ones that you used abroad with some other monitor?
4 A. Yes.

5 Q. Then with respect to the Motorola 20-inch TV monitor as
6 shown in Exhibit 2-168, it functioned for all intents and pur-
7 poses in the Atari game the same as the home television
8 receivers that you modified? A. Yes.

9 Q. You have described Pong and Pong Doubles and Superpong, and
10 referred to the circuit diagrams in Exhibit 2. **2 85470**

11 I think the next game in Exhibit 2 is Quadrapong, and I
12 think just at that point in time we diverged and talked about
13 the TV monitor. I would like you to refer to the section of
14 Exhibit 2 beginning with Page 2-64 and running to 2-83, and
15 tell me, if you can, if all of the pages in that section do
16 relate to a game made and sold by Atari, Incorporated known as
17 Quadrapong? A. Yes, they do.

18 Q. To the best of your knowledge, do they accurately represent
19 the various circuits and characteristics of the game Quadrapong
20 as made and sold by Atari? A. Yes.

21 Q. I think you said this game at the beginning used a 19-inch
22 Zenith television receiver? A. Correct.

23 Q. And that later on towards the end of the run you switched
24 to the Motorola 20-inch monitor; am I correct?

25 A. Correct.

26 Q. Did that necessitate any changes in the logic diagram of
27 Quadrapong as represented in Exhibit 2-73 that you know of?

28 A. I don't know if they did or not.

1 Q. There is a longhand number six on Exhibit 2-73 in the
2 lower, right-hand corner, and an illustration of the playing
3 field that the players see in Exhibit 2-73.

4 A. The game was licensed to Kee as part of their thing, so
5 it's very logical that it was a copy.

6 Q. Is that license between Atari and Kee in writing?

7 A. No, it isn't. When we started Kee, it was understood that
8 their first product was going to be Elimination which we would
9 later build and name Quadrapong.

10 Q. Did Kee Games introduce Elimination before Atari introduced
11 Quadrong in the marketplace? A. Yes, it did.

12 Q. Did the run at Kee Games also end before the Quadrapong
13 run at Atari ended? A. No. I think they ended
14 approximately the same time. 2 85471

15 Q. During the run of Quadrapong and Elimination by the
16 respective manufacturers, did they have completely separate
17 manufacturing facilities? A. Yes, they did. Well,
18 not completely. Many of the boards were manufactured in
19 Atari's facility. Computers.

20 Q. I will turn to Page 2-84 of Atari Exhibit 2 which is a
21 divider marked Space Race, and ask you to look at the pages
22 under that divider, Pages 2-85 through 2-96, and tell me if
23 they accurately describe and set forth the circuit diagrams
24 and the like of the game made and sold by Atari known as
25 Space Race? A. Yes, they do.

26 Q. Can you just generally describe how Space Race is played?

27 A. There is a rocket ship that is maneuvered on the screen
28 by pushing on an appropriate lever. The object is to miss a

1 moving asteroid belt.

2 Q. Does the asteroid belt move from left to right across the
3 television screen? A. From left to right and right
4 to left.

5 Q. Does the rocket ship that is under the control of the
6 player move along a single vertical line up and down?

7 A. Correct.

8 Q. Are you familiar with the game Asteroid? A. Correct.

9 Q. Are there any differences between the game Space Race and
10 the game Asteroid in circuitry?

11 A. Not to my knowledge.

2 85472

12 Q. I would like you to look at the circuit diagrams or logic
13 diagrams which are in the section of Exhibit 2 under Space
14 Race, and those diagrams are apparently numbered Pages 2-89 and
15 2-90. Is 2-89 a logic diagram of the game Space Race as made
16 and sold by Atari, Inc.? A. Yes.

17 Q. Was the entire run of Space Race, to the best of your know-
18 ledge, made in accordance with Exhibit 2-89?

19 A. Yes.

20 Q. Were there any changes at all of which you are aware during
21 the run? A. None.

22 Q. Approximately what was the beginning date of the manufactur-
23 ing run of Space Race? A. July 1st, '73.

24 Q. And when approximately was the last date of the run?

25 A. August '73.

26 Q. Is the game now obsolete? A. Yes.

27 Q. I notice in the title block on this logic diagram, Exhibit
28 2-89, the name Syzygy. Can you explain why that name appears in

1 the title block? A. We were doing business as Syzygy at
2 that time. Though we were incorporated as Atari, our dba was
3 Syzygy.

4 Q. Atari was formed in the summer of '72; am I correct?

5 A. Well, Atari was our corporation name. We were incorporated
6 in June of '72.

7 Q. Prior to that time, had you operated as Syzygy?

8 A. Company.

9 Q. Company? A. Yes. 2 85473

10 Q. As I understood it from your last deposition, at some point
11 in time you sold the name Syzygy to another company?

12 A. Yes.

13 Q. When did that occur, roughly? A. It was probably
14 in the fall of '73.

15 Q. At the time of the preparation of the drawing 2-89 which is
16 dated 5/31/73, what was the nature of Syzygy's business as
17 distinguishable from Atari's business, if the two were dis-
18 tinguishable? A. They weren't really distinguishable
19 at that time.

20 Q. What determined whether a drawing had the name Syzygy on it
21 as in the case of 2-89, or the name Atari on it as appeared in
22 some other documents I think prepared at about that same time?

23 A. It seems like most--

24 Q. It looks like quite a few of them are blank, don't show any
25 company name; is that correct?

26 A. (No response.)

27 Q. On Document 2-73 dated 12/10/73 I notice printed "Atari."

28 A. Pretty generally any of the games which reached production

1 after the summer of '73 had Atari's name because that was
2 really when the divergence of the names came in.

3 Q. Is the drawing Exhibit 2-89 the complete logic for the
4 game Space Race? A. No. It's on a couple of
5 sheets here.

6 Q. What other sheets are necessary for the complete logic of
7 Space Race? A. These two. It's 2-90 and 2-89.

8 Q. Is it possible to state which portions of the logic
9 functionally are on 2-89 and which portions are on 2-90?

10 A. Yes, I think so.

11 Q. Would you do so? A. Well, let's see, sync
12 generator and sync chain on 2-89. It looks like the score is
13 also on 2-89. Coin control, 2-89. Power supply.

14 On 2-90, the rocket ship generation, rocket ship motion,
15 star generation or asteroid generation.

16 Q. Is asteroid motion also determined by some logic on 2-90?
17 A. Yes, correct. **2 85474**

18 Q. Did I understand that all production of the game Space Race
19 utilized the Motorola TV monitor, or did some of that use a
20 television receiver? A. No. It was primarily
21 Hitachi.

22 Q. Which size screen was that? A. 12. Whether that
23 is reflected in what I previously said--

24 Q. Yes, I think you put it in terms of time, and I had a little
25 trouble keeping the time reference straight.

26 A. No, I think I did it in terms of games.

27 Q. All right. I would like to refer to the next section of
28 Atari Exhibit 2 which begins with the divider 2-97 having the

1 name "Gotcha." Can you briefly describe how Gotcha is played?
2 A. It's a chase game through a loose, moving maze where one
3 object manipulated by one player attempts to elude another
4 player which tries to catch the other object. Each item has
5 a fixed velocity. The chasor has a velocity of approximately
6 1.3 times the velocity of the chasee.

7 Q. Does the player who is controlling the chasee determine both
8 the vertical and horizontal motion of that part, that playing
9 piece, on the screen? A. Yes.

10 Q. Does the person controlling the chasee also control the
11 speed, or is the speed fixed?

12 A. The speed is fixed.

2 85475

13 Q. Is the speed the same throughout the entire game?

14 A. Yes, it is.

15 Q. With respect to the chasor, does the person controlling the
16 chasor also control both vertical and horizontal motion of
17 the chasor? A. Yes.

18 Q. Does he have any control over speed at all?

19 A. No, he does not.

20 Q. Does that playing piece travel at the same speed throughout
21 the game? A. Yes.

22 Q. Do you recall what that speed is in terms, oh, lines per
23 frame or any other reference that you could give?

24 A. I think it's equivalent to one picture element every other
25 frame which works out to be approximately one inch per second.
26 But I'm not exactly sure on that.

27 Q. When you say one picture element every other frame, is a
28 picture element a line or a plurality of lines?

1 A. Not necessarily. When you're talking about XY or any display device, generally there's an item which is called picture element, and that represents the minimum resolvable picture unit in it. In the vertical direction in the raster scan it happens to be lines. In a polar coordinate system, it happens to be the vector area, and it's a function of distance from the polar area in XY--

8 Q. Restrict yourself, if you will, to raster scan. What is the number of vertical lines that would constitute a picture element in the TV monitor type or receiver type of raster scale?

11 A. It depends whether you're going interlace or non-interlace.

12 Q. Am I correct that Atari games were all non-interlaced?

13 A. No, you are not correct in that. 2 85476

14 Q. In what games were the rasters interlaced, and in what games were they not?

15 A. In the car racing games we used an interlace system. The previous simpler games are non-interlaced. There is a certain amount of engineering debate whether interlacing really does give you additional resolution or not. Some people say yes, and some people say no, it's a figment of your imagination.

21 Q. Is the Motorola 20-inch TV monitor used both in interlaced games and non-interlaced games? A. Yes.

23 Q. Is the difference between an interlace and non-interlace a matter of controlling the synchronization signals?

25 A. Yes, pretty much. Some monitors respond to it better than others.

27 Q. Am I correct that Atari has used various television receivers, but only one monitor, the Motorola 20-inch monitor tha

1 you referred to?

A. In production. We have

2 evaluated several others, but it's by far the superior.

3 Q. What is the picture element, as you have used that term, in
4 the non-interlaced Motorola 20-inch monitor?

5 A. Are you talking about the 3db point or what?

6 Q. Whatever you meant by picture element?

7 A. Oh, vertically it's probably somewhere around-- Well, in
8 non-interlaced systems, it would be approximately half the line
9 scans. It would be approximately about 256, I think. Approx-
10 mately 256 vertical by probably 6 megahertz horizontally.
11 Probably 6 megahertz. And the picture element would be in terms
12 of size, jeez, I'd have to-- Does somebody have a calculator
13 with them?

2 85477

14 Q. I do have a calculator, but I think perhaps--

15 A. It's the reciprocal of 6 megahertz in terms of--

16 Q. You said that the chasor's velocity was one picture element
17 every other frame, or about one inch per second. What I was
18 trying to find out was, I rather gathered, then, that a picture
19 element was a certain number of lines wide or high. Am I
20 correct?

A. Right. In any kind of a display system

21 you have a potential of addressing so many points. That's

22 called a picture element. Generally the upper right-hand

23 corner is considered picture element zero zero, and the one

24 down in the other one is, if you have a 256 by 256 population,

25 then that would be picture element 256 256. It seems to me

26 that the picture element population that we had was approxi-

27 mately 256 by 383. But I'm not sure of those exact numbers.

28 Q. In what game did you have a picture element population of

1 256 by 383 that you just mentioned?

2 A. That was Computer Space, which was really the first, the
3 only game that I personally designed, which was a precursor of
4 what was sold to Nutting Associates, and that whole area goes
5 way back in ancient history. I think our engineers have
6 changed that somewhat, but it's not enough that--it's more of
7 a convenience than anything else. That definition is purely
8 arbitrary, whether you're using XY or raster or polar.

9 Q. In the Motorola TV 20-inch monitor that you have used in
10 Atari games or in the television receivers that you have used,
11 you said that the non-interlaced was 256 by 383, and the inter-
12 laced different? 2 85478

13 A. Yes, I think I'd say you've got 525 or something like that.

14 Q. So the interlaced would be 525 by--

15 A. Like I say, it supposedly doubles your resolution. But
16 some people believe it, and some people don't.

17 Q. Would the horizontal resolution remain 383 or whatever?

18 A. Yes. It's really limited by the frequency that the video
19 amplifier will pass, and the yoke--or the electron gun will
20 respond to. In some of the extremely high resolution computer
21 monitors, it can get up to 10 megahertz. I don't believe the
22 monitor will quite respond to that. Whereas the Hitachi, as
23 an example, was an extremely good monitor and it would respond
24 up into those frequencies.

25 Q. In the game Gotcha, as I understand your testimomy, the
26 chasor is trying to catch up with and hit the chasee; is that
27 correct? A. Right.

28 Q. If the chasor succeeds in catching up with and hitting the

1 chasee, what happens? A. You receive a point, and the
2 pieces reset to random positions on the screen, and the chase
3 starts anew.

4 Q. At the time that the chasor hits the chasee, do the pieces
5 or the players disappear, or do you see them move to a new
6 position? A. They disappear, I think. Well, one
7 frame they are there, and the next frame they are somewhere
8 else.

9 Q. They start in a new position? A. Right.

10 Q. If the chasee hits one of the walls of the maze that shows
11 on the TV screen, what happens? A. He bounces off. The
12 same thing happens to the other guy, too. 2 85479

13 Q. If the chasor controls his piece such that he hits a wall
14 the same thing happens, did you say? A. Yes.

15 Q. When the playing piece bounces off of one of the maze walls,
16 does the angle of reflection equal the angle of incidence?
17 A. I think it does. I'm not exactly sure.

18 Q. Please refer to any of the drawings that will assist you
19 in that. A. It's kind of hard to point some of
20 that stuff out. I could spend an hour trying to sort that out.
21 Just to the best of my recollection, I believe that it does.
22 It was whatever fell out easiest in circuitry.

23 Q. If the chasee succeeds in getting through the maze, what
24 happens at the end? A. Well, it's not a matter that
25 there is any specific goal in mind as far as the maze. It's
26 just simply the playing field or the obstacles which makes the
27 game interesting so that you can't take a direct line from
28 Point A to Point B. You have some obstacles that you have to